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BEHAVIORAL ECONOMICS: THE SOCIOECONOMIC RELATIONSHIP BETWEEN CRIME AND WEATHER SHOCKS IN THE UNITED STATES. ROBBERIES AND PICKPOCKETING

ПОВЕДЕНЧЕСКАЯ ЭКОНОМИКА: СОЦИАЛЬНО-ЭКОНОМИЧЕСКАЯ ЗАВИСИМОСТЬ МЕЖДУ ПРЕСТУПЛЕНИЯМИ И ПОГОДНЫМИ ШОКАМИ В США. ОГРАБЛЕНИЯ И КАРМАННЫЕ КРАЖИ

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Abstract. This paper examines a section of behavioral economics, namely the issue of the interdependence between crime rates and weather conditions. Our study examines weather shocks and their direct impact on socio-economic shocks such as crime: pickpocketing and robbery. The paper also provides economic and social findings regarding deviation in human behavior. An empirical study of various situations in the states of the United States is conducted and the relationship between weather conditions and the level of criminal circumstances that affect the economic integrity of society is examined. In the appendix, the authors of the study provide references to the use of special formulas for calculating the obtained statistical data, as well as recommendations for the implementation of the work in general.
Аннотация. В данной статье рассматривается раздел поведенческой экономики, а именно вопрос взаимозависимости между уровнем преступности и погодными условиями. В нашем исследовании рассматриваются вопросы погодных шоков и их непосредственного влияния на социо-экономические потрясения, такие как преступления: карманные кражи и ограбления. В статье также приведены экономические и социальные выводы относительно девиации поведения людей. Проводится эмпирическое исследование различных ситуаций в штатах США, изучается зависимость погодных условий и уровня криминальных обстоятельств, которые влияют на экономическую целостность общества. В приложении авторы исследования приводят ссылки на использование специальных формул для расчета полученных статистических данных, а также рекомендации по выполнению работы в целом.
Keywords: behavioral economics, socioeconomic shocks, weather shocks, crime rates, robbery, pickpocketing, behavioral deviance

Ключевые слова: поведенческая экономика, социально-экономические потрясения, шоки погодных условий, уровень преступности, ограбления, карманные кражи, девиация поведения

Introduction

Crime rate and influencing factors

To this date, the crime rate in America, England and most of the European regions is growing [17], which affects the demographic and socio-cultural integrity of these regions. The orthodox method of crime analysis implies the identification of causal relationships between the crime rate and indicators such as standard of living / level of inequality / level of income / gender /age / race / level of education, as in the book, which is dedicated to this and was released under the auspices of the FBI department [18]. For example, in their work [9], the authors found that the probability of crimes such as shoplifting, vandalism and threats, assaults and injuries decreases with years of study, but the probability of tax fraud increases with each additional year of education. The researchers provide another example of the relationship between the level of income inequality and the homicide rate [7]. Their cross-analysis results show that the relationship between income inequality and homicides is stable, the Gini coefficient has a positive effect on the crime rate in cross-models. This cluster of studies is aimed at identifying the relationships between the number of different types of crimes, such as murder, robbery, domestic violence, theft and social, demographic, economic variables, such as education, belonging to an ethnic group, age, criminal record, etc.

However, social, demographic and economic variables reflect the long-term dynamics of the crime rate. While weather shocks demonstrate the short-term dynamics of the crime rate. In their work [13], they show that the long-term consequences of temporary crime prevention efforts may be less than the short-term consequences.

Crime rate and weather

To narrow down our topic, we turn to the analysis of works on the relationship between weather shocks and crime rates. We took the weather binomials, which are presented in degrees Fahrenheit, not in degrees Celsius, since the scale of degrees Fahrenheit is wider than in degrees Celsius. There is a cluster of works in the scientific literature devoted to the study of the influence of the surrounding (physical) environment on the crime rate [2]. There are several well-established theories that are included in this article and that help to understand how the environment affects the crime rate. One of these articles [3], where the authors propose the concept of rational choice, that is, a large set of factors influence the decisions of the criminal, such as: location, population of this place and other factors. The article [2] adds temperature to these factors.

An important theory for understanding the impact of weather shocks on crime is the theory of routine activity [4]. It suggests that there is a cyclical nature in the behavior of an individual, but weather factors can affect this cyclicity. For example, in good weather, an individual will be outdoors more often than in bad weather, in other words, the risk of becoming a victim of crime is greater than when an individual is at home. On the other hand, if an individual is outdoors in bad weather, then there will be fewer potential witnesses in the streets than if the individual was outdoors in good weather.

In addition to the two theories listed above, there is also a theory of aggression [1]. A study was conducted on students, where they had to assess their condition and assess whether they would be able to attack a person with an electric shock. At temperatures ranging from 92 to 95 degrees Fahrenheit and temperatures ranging from 82 to 85, the authors observed a strong positive correlation between an increase in positive responses and an increased temperature. The study [15] confirms this theory. The authors investigated the level of sound signals of cars that stopped at a green light. The results showed that the higher the temperature and humidity were, the greater the number of sound signals from stopping cars were received. The study [8] showed a positive serial correlation between daily assaults in New Jersey and high temperatures. Rainfall and barometric pressure did not give significant results. Another study [11] that was conducted in Brazil from 1991 to 2015, using the lag method, as in the work [13] showed that unfavorably high temperatures caused drought, which led to an increase in the crime rate in municipalities. An article that also proves the presence of the influence of high temperature on the crime rate [10]. In it, the authors analyzed 8 months in the state of Texas, the city of Dallas. 3 variables were taken: day of the week, month and discomfort index. Such a time interval was taken because at that time these 8 months in the study showed a record temperature level. As a result, the discomfort index showed significant F statistics, and the variation of the model was 71% of all attacks.

Any arbitrary interval that is best suited for a particular sample can be present in temperature measurements. So, the study [5] hypothesized the identification of the relationship between temperature and attacks in the evening and showed 3-hour intervals. The authors selected the city of Minneapolis, the sampling time is 2 years. The results confirmed the hypothesis and showed a U-shaped inverted curve. Attacks in the evening hours correlate with the theory of routine activity.

Our work is somewhat similar to the work [19] where the author examines the impact of weather shocks on changes in monthly crime. In addition to the results obtained in the form of a strong positive effect of temperature on monthly crime, Ranson makes a forecast until 2099. Based on the results obtained, Ranson predicted a significant increase in murders, rapes, assaults and thefts due to the effect of global warming.

In our work, we take exactly hourly intervals within the day, as we believe that the key essence of our work is in short-term changes in weather variables and how they affect the crime rate. We believe that the smaller the intervals, the more accurate the results of the relationship between the crime rate and weather conditions will be.

Pickpocketing, robberies and weather

The next stage of narrowing the topic will be the consideration of a cluster of literature that examines the dependence of pickpocketing level and robberies on weather conditions. The article [6] analyzes the influence of air quality and temperature on the level of pickpocketing in public transport systems. The results showed that the temperature and time of year do not clearly correlate with the level of pickpocketing on buses. However, the indices that were responsible for air quality turned out to be highly significant and showed a substantial correlation with daily bus incidents. Another study [21] that examined robberies in Strathclyde, Scotland, used 6-hour intervals and assessed the relationship between the level of street robberies and weather variables. The authors obtained results that suggest that temperature, wind speed and humidity are important predictors of robberies at night and on weekends. A negative relationship with rain was revealed over the weekend, which, in general, is indirectly consistent with the conclusions from the article [4]. Just like the article [6], the researchers [16] explored the Chinese region in their scientific work. The results showed that robbery has a strong connection with the time of day, but does not have a clear correlation with weather. And burglaries have a strong correlation with both the time variable and the weather variable, namely, the sunny time of day.

Hypothesis and our motivation

The main issue of our study is to assess the impact of temperature and rainfall shocks on the level of pickpocketing and robbery in the United States of America.

Our first hypothesis is that in sunny weather, in weather when precipitation is minimal, there will be a greater number of robberies and pickpocketing.

The second hypothesis is that during the hours with a higher temperature, more robberies and pickpocketing will be committed. These hypotheses have strong arguments behind them, in the form of the theory of aggression, the theory of routine activity and the theory of rationality. We believe that an individual who is outdoors is at greater risk of committing pickpocketing, and an individual's home is more likely to be robbed. Individuals are most often outdoors precisely in good weather, which means that more often individuals leave their homes unattended. These assumptions are consistent with the theory of routine activity [4]. When an individual is outdoors, a potential thief, guided by the theory of rational choice [3], chooses places with a large number of people to commit a potential crime and chooses exactly those weather conditions when there will be the maximum number of potential victims outdoors. If a potential thief chooses not an individual as a target, but housing, then guided by the theory of rational choice, the thief will choose exactly those hours at which the chance of finding an individual at home is less, in other words, during sunny, warm, rain-free hours. The behavior of a thief is influenced by many factors, however, guided by the theory of aggression [1], a thief is more likely to commit a crime during the hours when the temperature is high.

The third hypothesis is that the largest number of robberies is committed in the evening and at night. When the sun goes down, it is harder for the victim to identify the criminal, and therefore it is easier for the second to hide and not be caught. The criminal is guided by the theory of rational choice [3].

The fourth hypothesis is that most pickpocketing occurs during rush hours, when people get to and from work, which is consistent with the theory of routine activities [4].

It is on the basis of such reasoning that our hypotheses are built. We believe that the study of the relationship between weather shocks and the crime rate is relevant at the moment and will help prevent some crimes.

Data

Crime data

The analysis for this article is based on a set of panel data on hourly crime rates and weather for 181 counties in 4 US states. The data set covers a 2-year period – 2020 and 2021 and contains 3006 unique observations on crimes and 3,171,120 observations on weather, broken down by month, hour and county. The data is taken from two main sources:

Data from Uniform Crime Reporting (UCR) of the U.S. Federal Bureau of Investigation (https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/downloads) and Daily weather data of the Climatology Network (GHCN-Daily) from the National Climate Data Center.

The FBI's UCR data is the most detailed and extensive continuously collected historical crime information in the United States of America. The data is based on monthly reports from approximately 18,000 local, county, city, university, state and tribal law enforcement agencies that voluntarily report crime data. The data includes the type of crime, the time exactly up to an hour, gender, race and age, both the offender and the attacker, the type of weapon with which the crime was committed, and more than 30 different indicators.

We selected the data in such a way that if the districts that provided data in 2020 and in 2021 differed within the same state, then such a district was automatically eliminated. This helps to avoid biased estimates of coefficients.

Weather data

The second most important data source is the GHCN-Daily Database, which is a compilation of weather station records collected from various sources and includes about 75,000 weather stations worldwide. GHCN-Daily data undergoes a number of quality checks, including checking for duplication of weather data, exceeding physical or climatological limits, consecutive data points that demonstrate excessive persistence or gaps, as well as data with inconsistencies within or between neighboring stations, unlike some other weather data sources (for example, the NCDC global summary for the day).

Initially, we collected about 10 million observations on all crimes in each of the US states, after the first stage of processing; the sample was narrowed by reducing the types of crimes under consideration and the number of states by dividing into quantiles and selecting one upper value from each. Districts in which no crimes were committed were not considered. Weather indicators were initially processed using the visual crossing platform (https://www.visualcrossing.com /), and then combined with crime rates in the Power BI program. Weather indicators for each of the districts were averaged by taking average values from stations located in the same district to avoid the problem of heterogeneous coverage of temperature and rainfall.

In order to avoid the problem of embarrassment of coefficients in the future, we screened out stations that gave a forecast in one year, but did not give a forecast in another year.

Summary statistics

From the Statistica website (statistica.com by StatSoft (Europe) GmbH: Fast, Efficient and User-friendly Data Analysis – with TIBCO® Data Science / Statistica™), a distribution was selected that included the average number of pickpockets and robberies per 100 thousand people. We decided to divide this series into quantiles (*Table 1*). The upper quantile is Columbia, the upper middle quantile is Maryland, the lower middle quantile is values from California to Georgia, the lower quantile is values from Indiana to Vermont. However, a state like California, although it is the first in the upper middle quantile, is not included in the analysis, since at the step of getting data from Uniform Crime Reporting (UCR), it was found that this state has only one year. Unfortunately, data collection even in a country like the USA is not ideal and structured. Therefore, it was decided to select four states, such as: Columbia, Maryland, New Mexico and Indiana.

After splitting the crime data into quantiles, when considering the indicator – the number of crimes per 100 thousand people, which was taken to exclude the difference between states that could arise due to the different number of people and the size of the state. A distribution function was constructed (*Diagram 1*), which reflects the difference in indicators between different quantiles of states. That is why we considered one state from each quantile.

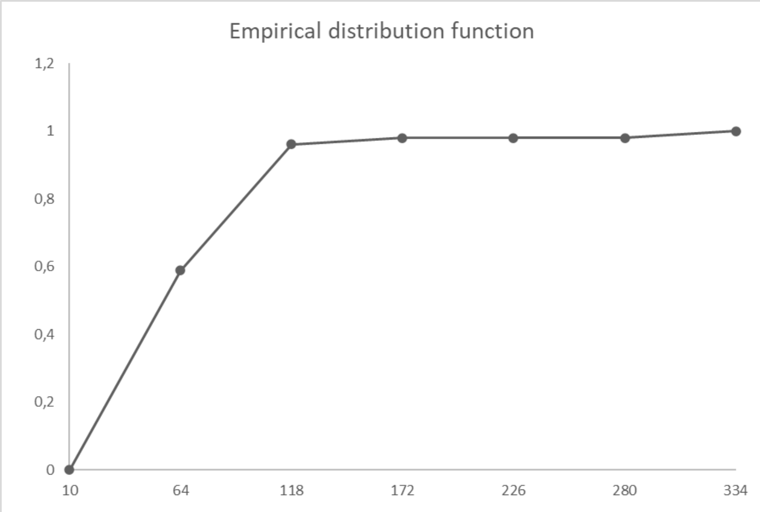

Diagram 1

Also, with such a breakdown, it was noticed that the lower quantile with the lowest number of crimes per 100 thousand people mainly included northwestern states (Idaho, Wyoming, Montana), and the largest number of crimes were committed in the southeastern and eastern states (Texas, Maryland, Illinois).

Table 1

District of Columbia	333	Oklahoma	59
Maryland	119	Connecticut	57
California	114	Alabama	54
New Mexico	99	Kentucky	53
Alaska	97	Wisconsin	53
Illinois	97	Arkansas	52
Texas	91	Oregon	51
New York	91	New Jersey	49
Nevada	89	Mississippi	48
Pennsylvania	84	Michigan	45
Arizona	84	Massachusetts	44
Tennessee	81	Utah	42
Louisiana	81	Nebraska	41
Missouri	74	Virginia	34

Delaware	71	Kansas	32
North Carolina	69	Rhode Island	32
Minnesota	69	South Dakota	31
Colorado	68	Iowa	30
Washington	67	Montana	26
Ohio	67	West Virginia	21
Georgia	66	New Hampshire	21
Indiana	62	North Dakota	20
Florida	62	Maine	13
Hawaii	62	Wyoming	11
South Carolina	60	Vermont	10

Initially, we had 181 counties in four states after building the distribution. Since in some districts the number of robberies and pickpockets per year was small (less than 10), we combined them by territorial similarity. For example, in Indiana, the counties of Starke and St. Joseph were joined to La Porte County. Joseph. Such associations were carried out as needed, so that in each group of districts the values were greater than 100. (*Diagram 2*) shows the total number of pickpockets and robberies combined by 16 districts in 4 states per month.

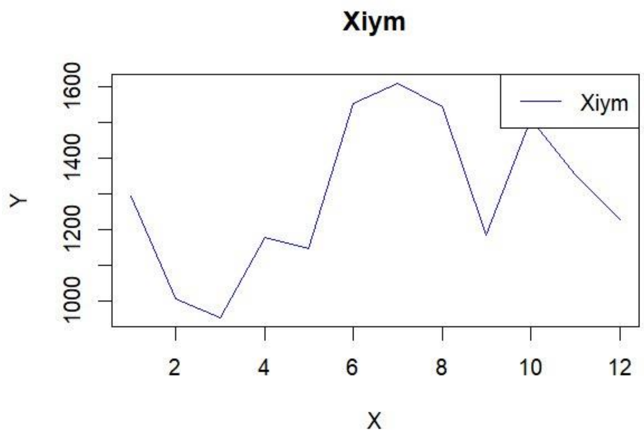

Diagram 2

This diagram shows that the peak of crime for these types of crimes occurs in summer and early autumn months, when the temperature is high. The second peak of crime occurs in October. This can be explained by the fact that there are many holidays in the USA in October and a large number of people are outdoors.

These partitioning steps were taken in order to select the most significant states in which the relative number of pickpockets and robberies per 100 thousand people is the largest.

In addition, two diagrams of the temperature distribution matrix and the crime matrix for 7 temperature binomials were constructed (*Diagram 3, Diagram 4*).

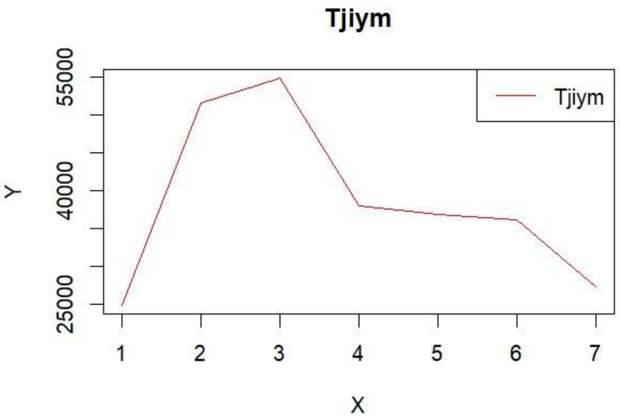

Diagram 3

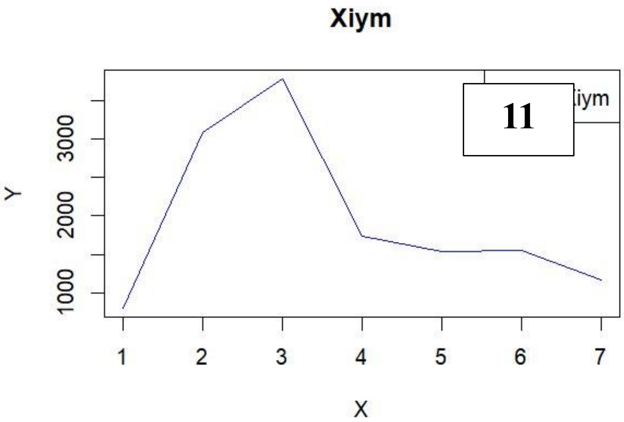

Diagram 4

When overlaying the data of the two diagrams, it can be seen that the matrix X_{iym} repeats the pattern of the matrix T_{iym}, which indicates the correct values in these two matrices. In other words, the area under the matrix is X_{iym}always smaller than the area under the matrix T_{iym} and the matrix X_{iym} repeats the pattern of the matrix T_{iym}. This is explained by the fact that the days on which crimes were committed (a subset) that relate to certain binomials are always included in a larger set of hours when the temperature fell into certain binomials by the hour (*Diagram 5*). It is especially clearly seen that both matrices reach a peak in the 3rd binome, a sharp decline goes to the 4th binome, a small spike is observed in the 6th binome.

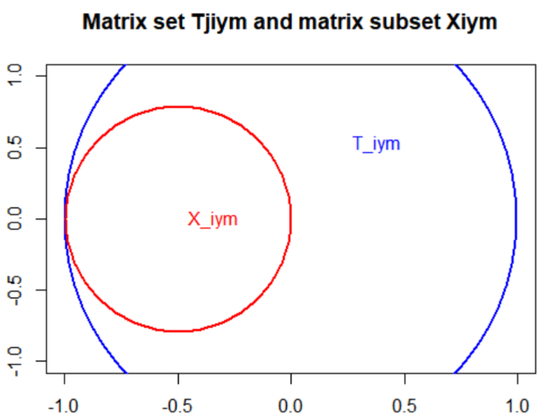

Diagram 5

In the same way, another matrix of pickpockets and robberies relates X_{iym} to the rainfall matrix P_{iym}.

Methodology

After the weather data was collected, a causal econometric model was created, which aimed to explain exactly how weather shocks affect pickpocketing and robberies. It was assumed that the number of crimes C_{iym} in a month m, district i, year y, would have such a Poisson distribution with such a probability density (*Equation 1*). It is used to model a dependent variable C_{iym} and describes the probability of observing a certain number of events in a given time interval, that is, it plays a role in estimating parameters in the Poisson regression model by the maximum likelihood method.

$$f(C_{iym}|X_{iym}) = \frac{\left(exp\left(-\mu(X_{iym})\right)\cdot\mu(X_{iym})^{C_{iym}}\right)}{C_{iym}!} \quad (1)$$

In this case, X_{iym} is a set of observed covariances. That is, in other words, the number of hours in which crimes were committed in a year$y$, district$i$, month m and which at the same time fell into one of the binomials of temperature or rainfall. Next, there is $\mu(X_{iym})$, which is a coupling function and represents the parametric form of the conditional mean value C_{iym} given X_{iym} (*Equation 2*).

$$\mu(X_{iym}) = E\left[C_{iym} \middle| X_{iym}\right] \qquad (2)$$

In this case, it is $\mu(X_{iym})$ used in Poisson regression in the form of an exponential form. The Poisson regression equation itself is presented below (*Equation 3*).

$$\mu(x_{iym}) = \exp\left(\sum_{j=1}^{7} \alpha_0^j T_{iym}^j + \sum_{k=1}^{5} \beta_0^k P_{iym}^k + \Phi_{sm} + \theta_{iy}\right) \qquad (3)$$

In this regression, T^j_{iym} denotes the number of hours in which the temperature fell in a y year, i district, month m in one of the binomials j. It P^k_{uym} means the same thing, but only the number of hours in which rainfall fell in a y year, i district, month m in one of the binomials k. Φ_{sm} is a set of fixed effects by state and month, θ_{iy} is a set of fixed effects for county and year.

Based on the article [19] that generated 11 temperature binomials, we figured 7 temperature binomials j to maximize the accuracy of observations. The temperature binomials were converted from degrees Celsius to degrees Fahrenheit so that the intervals that formed the binomials were wider. The first binomial is [10;29], the second is [30;39], the third is [40;49], the fourth is [50;59], the fifth is [60;69], the sixth is [70;79], the seventh is [80,99]. It can be noticed that the intervals have a mirror structure, in other words, the first and last have a width of 19 Fahrenheit, the central five are 9. Such a division is explained by the condition of uniformity. When constructing the regression, we also tried a different number of intervals with a different width, but other model specifications did not give the same results as a model with a specification of 7 binomials. To construct the precipitation distribution, 5 binomials were taken, as did [19]. These binomials had the following intervals. The first binomial is [0], the second is [1;4], the third is [5;14], the fourth is [15;29] and the fifth is [>30].

Next, a little bit about the construction process. The regression involves a vector C_{iym} containing 12 values (*Equation 4*) that reflect 12 months of observation (our interval is 2 years). Each vector value C_{iym} represents the sum of each row from the matrix X_{iym}. The columns of the matrix X_{iym} represent 7 binomials of the weather (7 columns).

$$c_{iym} = \left(\sum_{j=1}^{7} a_{1,7} + \sum_{j=1}^{7} (a+1)_{1,7} + \cdots + \sum_{j=1}^{7} (a+11)_{1,7}\right) \quad (4)$$

The matrix is X_{iym} represented as a combination of 7 binomials (columns) and 12 months (rows). For example, the cell of the a_1 first column of the first row represents the number of hours in which pickpocketing and robbery were committed in January in the range of [10;29] degrees Fahrenheit (*Equation 5*).

$$X_{iym} = \begin{pmatrix} a_1 & \cdots & a_7 \\ \vdots & \ddots & \vdots \\ (a+11)_1 & \cdots & (a+11)_7 \end{pmatrix} \quad (5)$$

The same matrix is X_{iym} built to calculate the number of pickpockets and robberies in hourly intervals by month by rainfall. The matrices for temperatures and rainfall differ. The last part of the methodological construction of the matrix T_{iym} and P_{iym}. Using the example of the matrix T_{iym}, you can see that the element of the b_1 first column of the first row is the number of hours in which the temperature in the first binomial fell (*Equation 6*).

$$T_{iym} = \begin{pmatrix} b_1 & \cdots & b_7 \\ \vdots & \ddots & \vdots \\ (b+11)_1 & \cdots & (b+11)_7 \end{pmatrix} \quad (6)$$

The matrix P_{iym} for rainfall works on exactly the same principle. Each vector that was taken from the connected table (crimes/weather) was filtered by binomials and months and added to the matrices. In total, for example, T_{iym} 192 vectors were added to the matrix for 16 districts from 4 US states.

The Poisson regression model with fixed effects is used to estimate parameters using the maximum likelihood method, as it was done [14]. In the analysis of standard errors, the block budstrep method is used.

The choice of such a model is due to three points. First, since the dependent variable includes the number of pickpockets and robberies in the county–year-month combination, these combinations can be zero, or have several zeros in combination. Zeros arise due to the fact that these types of crimes are quite rare (in comparison with murders, for example). For example, in the analysis, there were vectors in the matrices where there were zero values, since (a) in some months the temperature could not physically fall into certain binomials and (b) if the temperature fell into some binomials, then crimes could not be committed during these hours.

The second is that the maximum likelihood estimates of the coefficients in the Poisson model are unbiased for any binomial distribution. This helps to obtain reliable estimates, regardless of the assumption of a discrepancy between the Poisson distribution and empirical data [22].

The third is that the Poisson model does not have the problem of random parameters. Therefore, it is possible to estimate fixed effects and weather coefficients at the same time. (*Equation 3*) is an ideal solution to the problem of imposing the assumption that variables, weather and crime are interrelated. This method is much better than in the works of [13] and [20], which build their specifications based on the suggestion that the weather has a linear and quadratic effect on crime. Because of this, most of the effects are missed.

This problem can be avoided just by using a semi-parametric specification (*Equation 3*) of the weather. This gives an identification strategy that is based on the residual variation of pickpockets, robberies and weather variables by month in hourly intervals for different counties and years, after taking into account the patterns of maximum temperatures by month for all four states. Like [19], we are building our model that evaluates the effects of weather on the level of pickpocketing and robbery, controlling monthly patterns in weather and crime, however, unlike [19], we use more point intervals of one hour within a month, but in place with this, we take much fewer counties.

This approach is more accurate, in our opinion. A weighty argument for this is the fact that weather changes occur every minute and are very heterogeneous. In the Data section, we talk about how data was controlled based on the change from 2020 to 2021.

Results

This section will present the main results of our research.

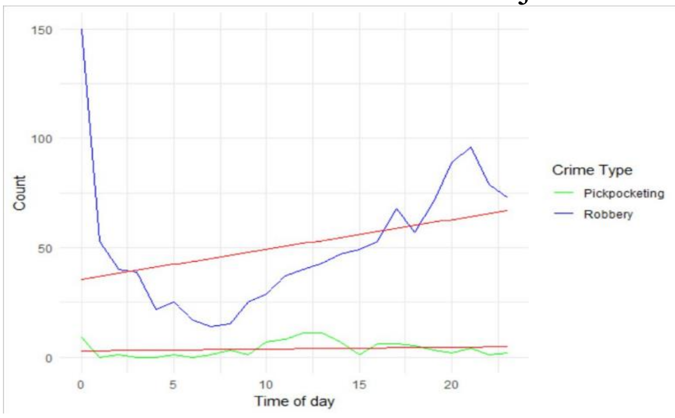

Diagram 6

To begin with, we looked at what period of the day the greatest number of robberies and pickpockets are committed. (*Diagram 6*) shows the results of this observation. Our hypothesis (Hypothesis #3) the fact that the largest number of robberies is committed in the evening and at night has been confirmed (the peak falls at the time from 20 p.m to 01 p.m). Regarding pickpocketing, we assumed (Hypothesis No. 4) that their maximum would be at the hours when people go to and from work (8-10 hours in the morning and 16-18 in the evening). Hypothesis No. 4 was not confirmed. The surge in pickpocketing occurred at the time from 10 a.m to 14 p.m, this can be attributed to the fact that a considerable number of social contacts between people also occur during the lunch break, and workers are more scattered during the break than when traveling to and from work.

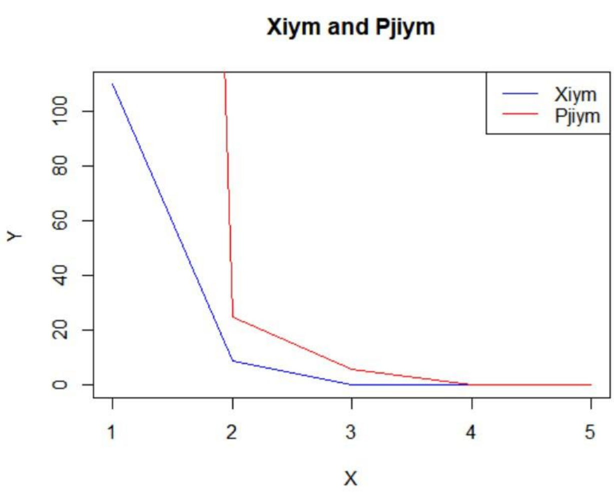

Diagram 7

After analyzing the data by constructing a Poisson regression, the hypothesis (Hypothesis No. 1) suggesting a positive relationship between crimes and zero or minimal precipitation was partially confirmed. It turned out that minimal precipitation does have a positive effect on the number of robberies and pickpocketing, but the weather shock caused by a heavy downpour (or snowfall) has a greater impact – this is due to the fact that visibility often worsens during heavy precipitation, which makes it harder to notice a potential thief, and people also try to hide from precipitation faster and they simply may not pay attention to the moment when their wallet is pulled out. (*Diagram 7*) shows the distribution of precipitation and crimes by precipitation binomials.

	Coefficient	Estimate	Pr...z..	Significance	Std_Error
(Intercept)	(Intercept)	3.51644	0.00000	***	0.14514
X1	X1	0.00708	0.00000	***	0.00155
X2	X2	0.04835	0.00372	***	0.01667
X3	X3	0.04889	0.55937		0.08375
X4	X4	-1.08596	0.00941	***	0.41822
X5	X5	1.44227	0.00080	***	0.43010

Temperature and crime

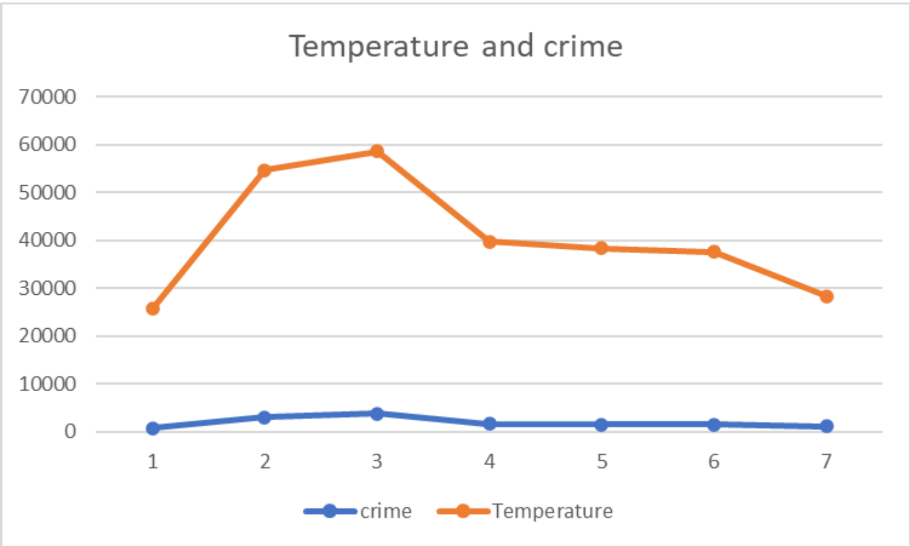

Diagram 8

When analyzing the temperature data, it was revealed that the greatest number of robberies and pickpocketing occurred in the weather interval (20-39 degrees Fahrenheit), but this is due to the fact that the number of these intervals was the largest in the period under review, this is illustrated in (*Diagram 8*).

	Coefficient	Estimate	Pr...z..	Significance	Std_Error
(Intercept)	(Intercept)	6.89560	0.00000	***	0.0697
X1	X1	0.00009	0.66755		0.0002
X2	X2	0.00011	0.36408		0.0001
X3	X3	0.00057	0.00000	***	0.0001
X4	X4	-0.00048	0.00021	***	0.0001
X5	X5	-0.00037	0.20271		0.0003
X6	X6	0.00124	0.00000	***	0.0002
X7	X7	0.00005	0.76704		0.0002

According to the regression results, our (Hypothesis No. 2) was confirmed only for moderately warm weather (70-79 degrees Fahrenheit), this binomial has the strongest positive effect on the number of crimes committed, which is consistent with the theory of routine activity [4]. Also, the interval (40-49 degrees Fahrenheit) had a positive effect – in this weather, people usually wear jackets and coats in which they put phones / wallets, and it is much easier to pull out of their pockets than out of their hands or summer clothes, since outerwear simply does not fit to the body, and it is easier not to notice the actions of a thief. In cold weather, in the winter months, robberies and pickpocketing are committed less, it can be motivated by the fact that it is more difficult to commit such crimes in warm clothes, due to the fact that it restricts movement, and it is harder to rob a person dressed in warm clothes.

Hypothesis No. 2 itself, suggesting a positive relationship between temperature and crimes at particularly high temperatures, was not confirmed in the interval (80-99 degrees Fahrenheit). Therefore, a particularly high temperature does not affect the number of crimes.

Discussion

The study of this topic has quite a lot of potential. Although the topic began to be investigated in the middle of the 20th century, however, an increase in accuracy, namely research on hourly or daily intervals, began to be carried out only in the late 2000s, early 2010s. This is characterized by the fact that with the advent of the century of new technologies, the quality and quantity of statistics collected has greatly increased. Since the topic of the relationship between weather shocks and crime rates is directly related to the accuracy of the data, it is logical to assume that these studies have a great future. A certain innovation in this work is the use of Poisson regression and consideration of hourly weather intervals (no work has been noticed where hourly intervals have been studied). We can also add that there are not so many previous studies that consider the relationship between weather shocks and robberies and pickpocketing.

Recently, people from law enforcement agencies are increasingly trying to prevent attempts to violate the social integrity of society. Criminology analysts increasingly lack the usual orthodox approach of identifying patterns between crime rates and social, physical or demographic variables.

A human is an irrational being whose behavior depends not only on how many years he spent on education, how many parents there were in his family and what his race is. Clearly, the relationship of the crime rate with such variables takes place, but a person is also subject to outside influences that do not depend on himself. Just such an impact is weather, namely changes in temperatures and rainfall. Very often, it is the weather that is the factor that pushes him to decide whether or not to commit a particular crime. We did not take murders or any even more serious crimes, for which a person in many cases needs a motive. We took pickpocketing and robberies. For such crimes, a motive is definitely also required, however, the result of a potential crime will depend on whether all the necessary conditions that are presented in the Introduction section are met. And in order to successfully prevent a potential crime, you need to know as many predictors as possible, which allow you to catch all the necessary correlations and increase the chance of catching the criminal.

For future research, we want to take more US states, try a different binomial breakdown, look at the relationship of crime rates with other weather variables, consider other types of crimes and include more years in our analysis. In addition, our supervisor recommended us to do the following research work, delving into the analysis of hourly intervals in which sunny weather and rain are observed.

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